Updated:
May 5, 1997

NSERC *Contact*

Volume 22, No. 1
Spring 1997

In this issue...

- The Light at the End of the Tunnel
- Reallocations Committee Chosen
- Four New Members Appointed to Council
- University-Industry Synergy Proceedings Available
- Budget for 1997-1998
- 1997 National Science and Engineering Prizes Announced
- NCE Program Now Permanent
- Program of Chairs in the Management of Technological Change Extended
- Technology Partnerships Program -- Highlights From the First Two Years
- New Information Kit Available
- New Research Networks Approved
- Dr. G. Drouin Appointed to Executive Committee
- NSERC Hires Director of Communications
- Postgraduate Survey Results
- Workshop on the Needs of the Next Generation Leads to Action Plan
- NSERC to Cooperate With New Venture Capital Fund
- Research Update
- Council Adopts Code to Enhance Public Confidence
- A Call for Nominations -- The 1998 Canada Gold Medal for Science and Engineering

The Light at the End of the Tunnel

Editorial by Tom Brzustowski

There was good news for Canadian university research in the recent federal budget, particularly the renewal of the Networks of Centres of Excellence (NCEs) and the creation of the Canada Foundation for Innovation (CFI).

Funding for Phase II of the NCE program had been slated to end in 1998. It was hoped that there might be a Phase III, but the government did better than that. The NCE program was made permanent $ that means no more phases. It will be funded at $47.4 million per year, the average annual expenditure level in Phase II. The three granting councils, NSERC, MRC, and SSHRC, will contribute $7 million annually to that total. Taking into account what the various partners have been contributing to the individual networks in Phase II, that $7 million will probably attract an additional $100 million or so to support research in the universities. That's a good deal!

I think that it's clear why this happened. The NCEs have turned out to be a major success; they do excellent work and they are big enough to have an impact on a national scale. The fourteen current NCEs involve about 1000 researchers, 1400 graduate students, and close to 500 postdoctoral fellows in 48 universities, with partners from more than 400 participating companies, 37 hospitals, and 76 government departments, ministries and agencies across the country. The accomplishments and the statistics of the NCEs are impressive, but they needed to be made widely known. The first step in doing that was a series of briefings for civil servants and political staff arranged by the NCE secretariat starting in 1995. This was followed in late 1996 by an intense and sustained program of communications and lobbying by the Chairs of the NCEs. As a result, the NCEs were well known and their importance understood among the decision-makers in government when the 1997 budget was being prepared.

The Canada Foundation for Innovation is the government's novel and massive response to the pressing need for a renewal of research infrastructure in universities and research hospitals. The need had become very great, but that was not new this year $ it had been growing for a long time. What was new, I think, was the way that need was impressed upon government. The new element was the cooperation and consistency among the many organizations and individuals who lobbied the government on this issue, and the intensity and persistence of their efforts. And there was political support from ministers, from standing committees of Parliament, and from within the government caucus. The research community and its supporters got their act together, and they were heard.

The Canada Foundation for Innovation is being set up at arm's length from government with an endowment of $800 million $ which instantly makes it the biggest foundation in Canada. Its mandate is to make investments in all kinds of research infrastructure in the universities and research hospitals to support research in science, engineering, health and environment. One of its objects will be to provide the "first opportunity" for new researchers to begin their careers in Canada with adequate infrastructure to undertake significant work in important modern fields. The CFI will be complementary to the granting councils and will work closely with them. The plan is that it will spend approximately $180 million per year in making investments that are at least matched from other sources, producing a total investment in research infrastructure of about $2 billion over five or six years. The applicants will be the institutions, and I hope that the first successful applications will be funded before the end of 1997.

But the budget also had good news of another sort. This was the first budget that I can recall in which science and technology and research and development were so prominent. Indeed, at a time when spending on its own operations is still severely constrained, and (previously announced) cuts in departmental base budgets are still being implemented, the government committed itself to making major new investments in university research. And the rationale offered for these investments was the importance of research in assuring the long-term prosperity and well-being of Canadians. The research community has been making that point for a long time, and found it encouraging to see it made also in the budget document. To me that suggests a welcome change in the mindset of government which may, in the long term, prove to be the most important feature of the budget.

But perhaps that should come as no surprise. In the last few years, much has been learned about university research in the natural sciences and engineering by the researchers themselves, by industry, and by government. Many researchers have learned that there can be a healthy balance between basic research and

project research on industrial problems, in an institution and even in the work of individual researchers. I believe that many companies and university researchers have now learned how to understand and work with one another to their mutual benefit $ those who generate new knowledge are now working more closely with those who use new knowledge productively. The word "partnership" has taken on a practical meaning $ the capacity for doing important things that none of the partners could do alone. I also think that governments are learning that basic research in the universities can be just as important for the prosperity and well-being of the public as research on industrial problems. They are now coming to understand that basic research in Canadian universities provides Canada with access to new knowledge from around the world, and also that it is the only means our society has for looking beyond the immediate pressures of the market and today's problems to identify what might be important in determining our prosperity and well-being in the long term.

The 1997 budget showed that Canada's financial position is improving. It is now expected that the federal budget will be balanced, and possibly running a surplus in a couple of years. The debate has already begun on what to do then $ pay down the national debt, cut taxes, or make new investments? I believe some new investments will be made, and therefore I want to ensure that the needs of the research community supported by NSERC are so well known and understood in government that NSERC will be an obvious target for some of the new money as soon as it becomes available.

The measures in the recent budget will provide much-needed relief in a couple of important areas, but Canadian university research in the natural sciences and engineering will still continue to have many pressing needs. I think that the most pressing need will be for more and larger research grants. The years of restraint have taken their toll in a way which may not be visible to the public. It is a fact that Canadian university researchers have become extraordinarily productive in terms of the excellence and the amount of research output for the money invested in their work. Their record is a story of great accomplishment which should be a national source of pride, but there is another story in what is not in the record. There are important areas of current research which Canadian researchers simply cannot afford to enter. And the research community as a whole has become conditioned to "think small." A shortage of funds in research grants means that many young Canadians who might have become great scientists and engineers working at the frontiers of their fields could not be supported as graduate student research assistants and chose to do other things; some have left the country. And there are too many Canadian scholars who have either left Canada or chosen not to come back here, because we could not offer them adequate support to do research at the leading edge of their fields.

A shortage of research grants means that young scientists setting out on their careers must start slowly, and our very best performers are held back, because they can't have the research support they need. And it also means that we are weakening our links with the international research community. We can no longer receive as many foreign students and postdoctoral researchers as the reputation of Canadian research attracts. Our ability to send Canadians for research training and collaboration with laboratories abroad is diminished, and our participation in major international research projects is declining, not for lack of ability or recognition, but for lack of money. As a nation, we invest tens of billions annually in education, but we may be jeopardizing the high end of the returns on that investment because we are a couple of hundred million dollars short in research support.

During the February competition, I met with all the Grant Selection Committees (GSCs) and I asked for their help in documenting the shortfall in NSERC funding. I asked each GSC to produce the best estimate of the difference between the appropriate funding of all the deserving proposals and what they actually had to distribute. This exercise does not duplicate Reallocation; its goal is to increase the total available for Research Grants. I asked the GSCs to think about this during the 1997 competition, and to produce their number immediately after the 1998 competition, so that NSERC might be ready to make its case as the preparation of the 1999 budget begins. The GSCs must, of course, continue to apply their usual high standards in arriving at their estimate of need, otherwise NSERC's case could be dismissed as a "wish list."

The Reallocations exercise will provide another important input. The submissions from the disciplines to the Reallocations Committee will add up to 250 pages in which some of the best minds in the country explain why additional resources for research in their fields are important for Canada. If the submissions are well written in plain language, NSERC might publish them together in one volume, and use it to communicate the needs widely.

While I think that an increase in Research Grants is NSERC's most pressing need, it's not the only one. We will also use a broad range of data to argue for greater support for the Undergraduate Student Research Awards program and the other NSERC programs which support people, as well as the full range of programs in partnership research.

When NSERC makes its case, we will be competing with many other demands for public funds. These competing demands will be pressed by Canadians who are every bit as smart, as eloquent, and as convinced of the essential importance of their particular causes as the best representatives of the research community, and probably much more experienced in political activity and lobbying. NSERC acting alone may not stand much chance of success. But if the research community is as persistent in its efforts and as consistent in its messages on this issue as it has been recently on infrastructure, then the prospects for success are good.

Is there light at the end of the tunnel? Yes, and it's very bright. But the tunnel is steep, and we still have far to climb.

Tom Brzustowski
President

Reallocations Committee Chosen

In January, Council approved the Terms of Reference and a Statement on Ethics for the Reallocations Committee. These principles will guide the Committee, ensuring a fair, open and efficient reallocations process.

Although Council had originally envisaged detailed procedures for voting and resolving conflict of interest, much of the feedback NSERC received from the community indicated that such procedures would be too constraining and counter to the basic principles of the reallocations exercise. In developing the conflict of interest policy, therefore, Council has opted to place its confidence in the integrity of each committee member, and in his or her wish to behave in an ethical fashion and in the interest of Canada as a whole. All members will be required to disclose

any real, potential or apparent conflict of interest due to their role on the Committee.

In his February 14 memo to the community announcing the membership of the Reallocations Committee, Dr. Brzustowski expressed NSERC's appreciation for the contributions the community is making to this effort and thanked those who are taking the lead in preparing their communities for the Reallocations exercise. The exercise is a community-based process to which many individuals are dedicating significant time and effort. NSERC believes the Canadian university research enterprise will be strengthened by its members' participation in this effort. The development of vision statements for the various disciplines in Canada and all the information gathered through the Reallocations process will make a strong case for new investments in science and engineering. In recent speeches, Industry Minister John Manley has indicated that, in two or three years, the fiscal environment will be much improved and the federal government may be in a position to decide where to make new investments. The Minister sees this as a great opportunity for science and technology, and NSERC wants to make sure that, when the time comes, decision-makers will immediately think of increasing investment in university research.

Council has selected the following as members of the Research Grants Reallocations Committee:

A. Bazergui, École Polytechnique
J.M. Brady, Oxford University
A. Caillé, University of Sherbrooke
A. Carty, National Research Council
B. Fenton, York University
S. Halperin, University of Toronto
R. Hardy (retired), Boyce Thompson Institute
P. Jollymore, NBTel
R. Price, Queen's University
I. Samarasekera, University of British Columbia
C. Triggle, Novartis Canada Inc.
M.A. White, Dalhousie University; and
J. Wright, PAPRICAN

Dr. L. Babiuk, Veterinary Infectious Diseases Organization, and a member of Council, will chair the Committee.
Information on the reallocations exercise.

Four New Members Appointed to Council

In January, Industry Minister John Manley announced the appointment of Lisa Claire Jeffrey, Peter Loewen, Hugh Morris and Georgia Pe-Piper to the Natural Sciences and Engineering Research Council for a term of three years.

Lisa Claire Jeffrey holds a Bachelor's degree in Physics from Princeton University, a Master's degree in Mathematics from the University of Cambridge and a Ph.D. in Mathematics from the University of Oxford. She was an Assistant Professor at Princeton from 1992 to 1995. Dr. Jeffrey is currently an Associate Professor of Mathematics and Statistics at McGill. Her areas of expertise include geometry and mathematical physics. She has received numerous scholarships

and prizes including the Phi Beta Kappa Prize for highest academic standing in a graduating class from Princeton in 1986. In 1995, she was awarded one of 15 NSERC Women's Faculty Awards. She was recently awarded the Aisenstadt Prize, a scientific award presented annually by the Centre de Recherche Mathématique (University of Montreal) to young Canadian mathematicians for excellence in research.

Peter Loewen holds a Bachelor of Science degree and a Ph.D. from the University of Alberta. He is currently a Professor and Head of the Department of Microbiology at the University of Manitoba. An active researcher, Dr. Loewen collaborates extensively with colleagues both in Canada and abroad and is involved in graduate student training. His research involves studies of expression, structure and function of catalases from E. coli. Dr. Loewen is an associate editor of the Canadian Journal of Microbiology.

Hugh Morris holds a Bachelor of Science degree and a Ph.D. in Mining Geology from the University of Witwatersrand in Johannesburg, South Africa. Since 1993, Dr. Morris has been President of the Padre Resources Corporation in Vancouver. He was Chairman of the Board and CEO of Imperial Metals Corporation from 1983 to 1993. An active professional in the geological and mining community, Dr. Morris has held numerous professional affiliations including President of the Canadian Geoscience Council, Chairman of the Board for Lithoprobe and Chairman of the Board for the Canadian Global Change Program.

Georgia Pe-Piper holds a Bachelor of Science degree (Geology and Biology) from Athens University and a Ph.D. (Mineralogy and Petrology) from Cambridge University. She is currently a Professor of Geology at Saint Mary's University in Halifax. A recipient of research funding from NSERC, Energy, Mines and Resources and the Geological Survey of Canada, Dr. Pe-Piper's research involves studies of volcanic rocks in Nova Scotia, Greece and offshore in eastern Canada. In 1993, Dr. Pe-Piper was guest editor of a special issue of Geoscience Canada on "Women in Geoscience: the next decade."

University-Industry Synergy Proceedings Available

The Report of the 2nd Annual Symposium on University-Industry R&D Collaboration, held October 29 and 30, 1996, in Montreal, is now available. It can be obtained from:

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Internet: http:/www.nserc.ca/publicat.htm

Budget for 1997-1998

Table 1 presents NSERC's current forecast expenditure for 1996-1997 and the planned investment for 1997-1998.

Readers should note that:

- a significant portion of the amounts shown under planned investment for 1997-1998 is already committed for instalments of awards approved in earlier years;
- the amounts shown against the Collaborative Special Project Grants are totally committed, as this program has been terminated; and
- funds for new projects under Research Networks are extremely limited.

The dollar value (per annum) of NSERC stipends and salary contributions for 1997-1998 is as follows:

Undergraduate Student Research Awards (Industrial/Small University) (per month)	900
Postgraduate Scholarships	
1st and 2nd years	15,700
3rd and 4th years	17,400
Industrial Postgraduate Scholarships	12,500
1967 Science and Engineering Scholarships*	21,300
Postdoctoral Fellowships	30,000
Research Reorientation Associateships*	29,000
Canada International Fellowships*	29,000
University Research Fellowships* and Women's Faculty Awards* (salary contribution)	30,500
Industrial Research Fellowships (salary contribution)	25,000
Stipends payable from research grants:	
postgraduate students (maximum)	15,000
postdoctoral fellows (minimum)	22,900
postdoctoral fellows (maximum)	29,000
* Programs are being phased out.	

Table 1: NSERC Budget, 1997-1998 (millions of dollars)

Activity	Forecast Expenditure	Planned Investment
	1996-1997	**1997-1998**
Core Programs		
Research Grants		
Research Grants	191.2	192.2
Infrastructure Grants/		

Major Facilities Access Grants	4.7	3.8
Equipment Grants	19.5	22.3
Collaborative Special Project Grants	7.8	6.0
Subatomic Physics Envelope	18.1	17.3
Subtotal	**241.3**	**241.6**
Research Partnerships		
Strategic Projects	34.5	31.5
University - Industry Projects	43.3	42.1
Partnerships Projects	2.6	2.6
Research Networks	9.2	11.0
Networks of Centres of Excellence	22.7	21.6
Subtotal	**112.3**	**108.9**
Research Training		
Postgraduate Scholarships	39.9	40.0
Postdoctoral Fellowships	9.5	9.1
Industrial Research Fellowships	3.9	3.9
Industry/Small University		
Undergraduate Student Research Awards	2.4	2.4
Subtotal	**55.7**	**55.4**
General Support	1.9	1.2
Total Core	**411.2**	**407.1**

Programs		
Non - Core Programs	**21.5**	**10.1**
Grants and Scholarships Total	**432.7**	**417.2**
Administration	16.9	16.7
TOTAL	**449.6**	**433.9**

1997 National Science and Engineering Prizes Announced

Engineer a Gold Medal Winner

Dr. Keith Brimacombe, Alcan Chair of Process Engineering and Director of the Centre for Metallurgical Process Engineering at the **University of British Columbia**, is the 1997 winner of the Canada Gold Medal for Science and Engineering. The announcement was made in Vancouver on March 20.

"Keith Brimacombe is one of the innovative giants of 20th century metallurgical process engineering, and a role model for young Canadian scientists and engineers," said Dr. Thomas A. Brzustowski, President of NSERC. He added that Dr. Brimacombe has also been a major contributor to the economic competitiveness of the Canadian steel industry and to the nationwide effort to build productive research links between industry and universities.

Insights from Dr. Brimacombe's research on metallurgical processes have led to key improvements to industrial processes such as the continuous casting of steel, direct-chill casting of zinc, copper converting and zinc fuming. "What underlies virtually all my work is an attempt to link the product -- be it steel, aluminum or a ceramic material -- to the process that makes it," explains Dr. Brimacombe.

His research group uses computer models to make the link between process and product. Each model is validated with measurements taken in working plants and mills around the world. "Computer models give us insight into processes," adds Dr. Brimacombe. "We're always looking for what really matters in a particular process. Once we know that, we can begin to play with the specific thing or things in order to improve the process."

"One of the most important things I can do is improve processes that make metals so that they contribute more powerfully to the economy and strengthen the competitiveness of companies in Canada."

The Canada Gold Medal honours outstanding, sustained, lifetime contributions to Canadian research. Individuals in all sectors concerned with the advancement of research -- university, business, industry and government -- may be nominated for the award. The final selection is made by an NSERC award committee on the basis of an international peer evaluation.

Steacie Fellowship and Doctoral Prize Winners Announced

At an earlier (February 17) press conference in Ottawa, Dr. Jon Gerrard, Secretary of State (Science, Research and Development) and Dr. Brzustowski announced the 1997 recipients of the Council's E.W.R. Steacie Memorial Fellowships and Doctoral prizes.

Steacie Fellows

In praising the recipients of the Steacie Fellowships, Dr. Brzustowski noted that their accomplishments should inspire young Canadians in the fields of science and engineering to strive for excellence. The awards recognize the outstanding contributions of university researchers who, at a relatively early stage of their careers, are already developing an international reputation.

The winners of the 1997 E.W.R. Steacie Fellowships are:

Dr. C. Ross Ethier, an Associate Professor in the Department of Mechanical and Industrial Engineering at the **University of Toronto**, who has done pioneering work in the rapidly growing field of biomedical engineering. His studies on fluid flow in the eye have furthered understanding of the link between fluid drainage in the eye and the development of glaucoma.

Dr. Ian Manners, a Professor in the Department of Chemistry at the **University of Toronto**, who is recognized as one of Canada's most dynamic inorganic chemists. A polymerization approach discovered by his group is virtually unprecedented in transition metal-based polymer science. It opens an easy route to the synthesis of a range of new and potentially valuable metal-containing polymers.

Dr. Robert J. Tibshirani, a Professor in the Department of Preventive Medicine & Biostatistics at the **University of Toronto**. He is recognized internationally for his leadership in computer-based statistical methodology, particularly for his research in generalized additive models and the bootstrap, and the successful application of statistical methods in medical science.

Dr. Andrew Weaver, an Associate Professor in the School of Earth and Ocean Sciences at the **University of Victoria**, who has earned an international reputation in the area of ocean-atmosphere modeling. His research has greatly extended the understanding of how the ocean influences climatic variability. It suggests that a world affected by global warming could face sudden swings in climate.

The Steacie Fellowships provide the recipients with an opportunity to expand their research programs and obtain additional research assistance.

Doctoral Prize Winners

Each of the following winners of NSERC's national prize for the most outstanding doctoral research in Canada last year will receive $5,000 and a silver medal:

Dr. Tricia L. Breen, Department of Chemistry, **University of Windsor**. She has won international recognition for her work in the area of multiligand bond

chemistry and inorganometallics.

Dr. Timothy Moon-Yew Chan, Department of Computer Science, **University of British Columbia**. At 19, he completed one of the most remarkable theses seen in computational geometry in many years.

Dr. John R. Long, Department of Electronics, **Carleton University**. He achieved a major breakthrough in the integration of radio receiver circuits onto integrated circuits, and his findings are expected to have a major impact on cell phone circuit design.

Dr. Gordon K. Squires, Department of Physics, **University of Toronto**. He has established himself as a leader in the hunt to identify the nature of the mysterious "dark matter," which constitutes over 90% of the mass of the universe.

Each university in Canada may nominate two candidates for the Doctoral Prize.

The awards will be presented at a ceremony in Ottawa on June 11.
Information on the winners.

NCE Program Now Permanent

The February 18 budget announcement included good news for the Networks of Centres of Excellence (NCE) Program.

Permanent Status for the NCE Program

As reported by Dr. Brzustowski (editorial), the government has given the NCE program permanent status and agreed to provide on-going funding of $47.4 million annually. In a period of fiscal restraint, this decision must be viewed as an important achievement on the part of the NCE program and a tribute to its success over the past eight years. The networks will now be in a better position to plan their long-term strategy and attract and retain private and public partners.

Seven-year Funding Cycles for the Networks

Longer-term funding has allowed the program to establish a life cycle that permits seven years of funding for a network before it must again compete with other networks for funding. Successful networks are now eligible to receive up to 14 years of NCE support over two 7-year funding cycles. This change was stimulated by the fact that it takes time to establish these major national initiatives and time for innovations and discoveries to reach their full market potential. This change also puts networks in a better position to adapt to changes in priorities in the sectors in which they operate.

Funds for New Networks

Renewal within the NCE program is essential. Approximately 25% of each competition budget will be set aside to fund new networks through competitions that will now occur at regular intervals of three to four years. If the competition is to involve target areas, then following a consultation process, the NCE Steering Committee will recommend target areas to the government for decision. Target

areas will be announced six months prior to the application deadline for letters of intent.

The NCE program is an integral part of the government's S&T strategy. The networks produce significant research discoveries and innovations; ensure that they are transferred to potential industrial users and public policy-makers quickly; and train highly qualified researchers, often in settings outside the university. NCE funding is used as leverage by the networks to attract private and public sector collaboration. Canada derives social as well as economic benefits from the commercialization of marketable products and processes originating from Network research.

At present, there are 14 networks conducting research in the following strategic areas: health and biotechnology, information technology, infrastructure, natural resources, and technology-based learning.

The new NCE Program Guide has been posted on the NCE Web site. For more information, contact the NCE Program Directorate, by telephone, at (613) 995-6010, or by fax, at (613) 992-7356.

Program of Chairs in the Management of Technological Change Extended

NSERC and the Social Sciences and Humanities Research Council (SSHRC) are working out the final details of an agreement to continue their support of the joint Chairs in the Management of Technological Change program. Modelled on the highly successful NSERC Industrial Research Chairs program, the program was set up in 1989 to support research in technological change and entrepreneurship. Twelve awards have been made to date; they support interdisciplinary studies, teaching, and training activities that are shedding new light on the processes of change and entrepreneurship, and developing strategies for managing them.

An announcement on the extension and the date for the next competition is expected in April, and it will be mailed to university Research Grants Offices.

For information, contact:

Margaret Caughey
Tel. 613-996-4993
E-mail: mec@nserc.ca

Technology Partnerships Program:

Highlights From the First Two Years

University researchers interested in seeing their discoveries exploited in the marketplace are getting assistance from the Technology Partnerships Program (TPP), a pilot program intended to establish commercial viability of technologies or other discoveries that appear to have potential industrial applications.

A joint initiative of Industry Canada and the three granting councils, the TPP contributes up to half the R&D costs involved in the demonstration or field testing phase needed to establish commercial viability. The industrial partners who carry the balance of the cost and will take the product or service to market, are Canadian firms with up to 500 employees.

Twelve institutions have had 25 projects approved:

UBC (5)
Laval (4)
Sherbrooke (3)
Toronto (3)
Guelph (2)
Queen's (2)
Alberta (1)
Centre de recherche informatique de Montréal (1)
Concordia (1)
McGill (1)
Ottawa (1)
Waterloo (1).

On-going projects involve a breadth of areas:

- drug or herbicide development (6)
- software applications (4)
- industrial materials or processes (7)
- communications technology (3), and
- specialized instruments and equipment (5).

The products are as diverse as sophisticated hay-mowing machines, special ceramics for industrial uses, software packages for training children in wheelchairs and classifying legal documents, new treatments for several diseases, devices for opening garage doors and containers for shipping hazardous substances.

Almost 70% of the proposals submitted have been funded. Nearly half of the projects (12) are expected to last 3 years, the rest two years (10) or one year or less (3). The average annual instalment is $97,000. Most of the university applicants are NSERC grantees, a few having been supported by MRC or SSHRC. Three-quarters of the participating companies have fewer than 50 employees.

The pilot program will accept applications until the end of 1997. A recently updated TPP information kit is available (see below). For information, contact the Secretariat.

New Information Kit Available

The Technology Partnerships Program (TPP) information kit now includes guidelines on writing project business plans. University researchers and people in small companies are often unsure what to include in the business plan, and the guidelines clearly describe the topics that should be covered. In preparing the guidelines, the Secretariat sought advice from the TPP Project Review Committee members, all of whom have business experience.

Other documents included in the kit are the program description, guidelines for applications, guidelines for external reviewers, and a brochure on the TPP. Information kits are available from university Research Grants and Industry Liaison Offices. Kits and advice on how to apply are also available from:

TPP Secretariat, NSERC
350 Albert Street
Ottawa K1A 0R6

Contact:

Margaret Caughey
Tel. 613-996-4993
E-mail: mec@nserc.ca

Christiane Villemure
Tel. 613-996-2145
E-mail: cmv@nserc.ca

New Research Networks Approved

The Research Networks Selection Committee (RNSC) held its second competition meeting on January 23 and 24, 1997. Ten proposals requesting nearly $11 million in year one were reviewed.

On the basis of input from external referees and site visits, the RNSC recommended funding for three research network proposals valued at $2.2 million in the first year, resulting in a competition success rate of 30% and a funding rate of 20.7%. The following research networks will be funded.

NOW Research Network

Led by Dr. L. Fortier the NOW Research Network (International North Polynya Study) will be based at Laval University and brings together Canadian and international expertise in Arctic oceanography. Canadian- and U.S.-led expeditions to the North Water will enable scientists to study and model its role in the biological productivity of the Arctic Ocean, in the removal and locking up of carbon from the atmosphere and the possible forcing of oceanographic and climate change. The study of polynyas (large bodies of arctic water that remain open all winter or that become free early in the spring) will help scientists forecast the response of the Arctic Ocean to climate change. NSERC's total funding of $4.7 million over four years will leverage an additional $28 million (cash and in kind) contribution from public and private sector partner organizations in Canada and abroad.

Characterization and Exploitation of the Metabolic Activities of Lactic Acid Bacteria With High Interest to the Dairy Industry

Dr. C. Lacroix from Laval University and his collaborators from three Canadian universities (Laval, Moncton, and Alberta), and from Agriculture and Agri-Food Canada, as well as representatives from the Canadian dairy industry (Novalait inc., Les Producteurs laitiers du Canada, Institut Rosell inc.) have been awarded

$2.39 million over five years for a research network investigating the "Characterization and Exploitation of the Metabolic Activities of Lactic Acid Bacteria With High Interest to the Dairy Industry." The goal of the network is to develop fundamental and technical knowledge about certain very promising metabolic activities of lactic bacteria. This knowledge will be used in the production of fermented dairy products and the development of functional new bioingredients for food uses. Industrial partners will provide $850,000 in cash and $296,000 in kind to support the network, and Agriculture and Agri-Food Canada $850,000 in cash and $479,000 in kind. NSERC's investment in the project amounts to less than half of the total cost.

Computing and Mathematical Modelling

Researchers affiliated with five research centres in the Montreal region (Centre de recherches mathématiques, Centre de recherche sur les transports, Groupe d'études et de recherche en analyse des décisions, Centre de recherche en calcul appliqué, Centre interuniversitaire de recherche en analyse des organisations) have joined together to establish a research network in Computing and Mathematical Modelling. This group, led by Dr. Luc Vinet of the Centre de recherches mathématiques, will focus on the resolution of common industrial problems. It aims to develop new tools for computing and modelling, to increase the variety of applications by pooling expertise and to accelerate their implementation. The network builds upon the well established infrastructures of its constituent elements in areas such as finance and economics, management science, transportation research, computation and industrial modeling. NSERC's total investment of $3 million will be used to leverage industrial cash contributions exceeding $4 million from 16 partner organizations.

Preparing a Winning Proposal

During its recent review, the RNSC made a number of comments on the quality of the proposals. The committee viewed the three networks recommended for funding as good models of research networks, and suggested that researchers interested in improving the quality of their research network applications pay greater attention to certain aspects of the proposal:

- Applicants must demonstrate the value-added or incremental benefits of receiving network funding. This means that in addition to identifying the various projects and activities, applicants must indicate how these projects or activities will together solve a common problem or reach a common goal. Otherwise, the committee cannot clearly distinguish between the results that could be obtained if the sub-projects were to be funded through other funding mechanisms as individual projects, as compared to the results that could be obtained if the sub-projects were to receive funding for a network of projects. In other words, a network must be shown to be more than the sum of its parts.
- Applicants must describe their strategies for training highly qualified personnel. In addition to indicating in the proposed budget the graduate students, postdoctoral fellows, technicians, and research associates who will participate in the network projects, applicants must describe how they will participate in the research and what benefit they will receive. Training strategies should promote multidisciplinary, multisectorial approaches to research and encourage research trainees to consider the economic and social implications of their work.
- Applicants must clearly describe any research agreements and Intellectual

Property agreements being prepared or negotiated between all parties. The committee needs this information to assess fully the level of participation and contributions from all partners. It is also an indication of the level of interaction of the network team and their ability to resolve potential problems well in advance.

The deadline for submitting letters of intent for the next Research Networks competition is June 1, 1997.

Dr. G. Drouin Appointed to Executive Committee

In January, Council approved the appointment of Dr. Gilbert Drouin, Vice-President, Technological Development, Orthofab, to the Executive Committee of Council. Dr. Drouin recently moved to the private sector from +cole Polytechnique where he was on staff for several years. A member of Council since June 1995, Dr. Drouin has extensive NSERC experience, having served as a Grant Selection Committee member and as a group chair and member of the Committee on Research Grants. He is currently a member of the Committee on Research Partnerships.

The Executive Committee exercises the powers and functions of Council between Council meetings. It is composed of the President, the Vice-President and at least six other members selected by the Council.

NSERC Hires Director of Communications

NSERC is pleased to announce the appointment of Mr. Tim Nau as Director of Communications. Mr. Nau has had a distinguished career in government communications and as an editor, broadcaster, book author, and freelance writer for numerous national and international publications.

From 1988 to 1996, Mr. Nau was a Communications and Marketing Director with the Government of Ontario, responsible at various times for communications at three ministries: Environment, Colleges and Universities, and Labour. At the Ministry of Colleges and Universities, he developed Electronic Horizons, an award-winning software program on higher education adopted by most school systems in Ontario. Mr. Nau is a past president of the Ontario Government Council of Communications Directors and the Ontario Government Council of French-language Services Co-ordinators. From 1985 to 1987, he held the position of Chef du service administratif du collége universitaire Glendon, York University. He has also taught at several Ontario universities.

Postgraduate Survey Results

Over the past three summers, NSERC has conducted surveys of former postgraduate scholarship winners. The career status of former scholars and the importance that they attach to NSERC funding are important indicators of the value of our programs.

Those surveyed included first-year Postgraduate Scholarship winners in 1985, 1986, and 1987, all 1967 Science and Engineering Scholarship winners in 1985, and new 1967 Science and Engineering Scholarship winners in 1986 and 1987. In all, questionnaires were sent to 1,416 students. A total of 770 responses were received, for a response rate of 54.4%. The major findings of the surveys can be summarized as follows:

- The unemployment rate for respondents is very low, estimated to be below 3%.
- A high percentage (66%) of respondents are active in a research and development capacity, using their training for one of the primary purposes of the scholarship programs.
- 72.2% of respondents feel that their graduate training was "critical" to their careers.
- 135 respondents (17.5% of the total) were living outside the country at the time of the survey. More than half of these respondents intend to return to Canada.
- 96% of the respondents completed the degree (master's or doctorate) for which they received NSERC funding.
- 89.4% of the respondents said that NSERC funding was at least moderately important to their undertaking or continuing with their studies.
- The respondents' average completion times (1986 and 1987 respondents) for bachelor's, master's and doctoral degrees were 3.7, 2.3 and 4.4 years, respectively. The average completion times for master's and doctoral degrees reported in this survey are similar to times reported by the Canadian Association of Graduate Schools for a much larger population.
- 69% of the 1967 Science and Engineering scholarship winners went on to complete their doctorate, an important objective of the program.
- Just under half (43%) of the respondents wrote remarks in the Comments section of the questionnaire. Most of the remarks were "positive" -- expressing gratitude for having had the scholarship, and otherwise complimentary towards NSERC.

A copy of the Postgraduate Surveys Report can be obtained from NSERC's Distribution Centre. The report will also be available from NSERC's Web site later this summer.

Workshop on the Needs of the Next Generation Leads to Action Plan

At its meeting in January, Council discussed the recommendations addressed to NSERC arising from the Workshop on the Needs of the Next Generation of Canadian University Researchers, which was held in October 1996. Suggestions ranged from actions which could be taken relatively quickly within available resources to proposals requiring more in depth analysis and discussion with Council's standing committees and Council itself.

Council agreed that staff should proceed as soon as possible on the more straightforward actions and that others requiring more detailed analysis and input from standing committees should proceed as resources permit. Council welcomed a recommendation from the President for another workshop $ one that would involve stronger participation from the private sector and focus on preparing the next generation to play a leadership role in strengthening Canada's innovation

system.

A summary of the recommendations and proposed action plan will be posted on NSERC's Web site in the very near future.

NSERC to Cooperate With New Venture Capital Fund

The Natural Sciences and Engineering Research Council has concluded an arrangement with the recently launched Canadian Science and Technology Growth Fund (CSTGF). Chaired by Dr. Robert Church, the CSTGF is a labour-sponsored investment fund, administered by Talvest Fund Management Inc. The CSTGF will invest in Canadian companies undertaking early stage commercialization of research or product development in the S&T sector.

According to Dr. Peter Morand, CSTGF President and CEO, the fund seeks to create wealth and jobs from the excellence of Canadian science and engineering by making long-term venture capital investments in existing and emerging Canadian technology companies. "The fund is modelled on the highly successful Canadian Medical Discoveries Fund, which has led a fivefold increase in venture capital investments in Canada's life sciences sector in only three years," he said.

From NSERC's perspective, the fund is an exciting development; it represents the potential for a closer linking of the high quality research results generated by Canadian universities to investment by the financial sector. It is NSERC's hope that this fund will build on the public investment in research to encourage the development of new products and improved services upon which Canada's commercial and economic success increasingly depends. It is also the hope that the investment community will add its voice to those supporting the importance of public investment in research in Canadian universities. The CSTGF is just the latest example of an initiative whose success will depend on the high quality of the basic research carried out by the researchers in our universities.

Under the terms of its non-exclusive agreement with the CSTGF, NSERC will help the fund identify investment opportunities. Proceeding only with the express approval of participating researchers, NSERC will provide the CSTGF with access to project summaries, peer review reports and details of research proposals. All disclosures within this agreement will be confidential. The Fund has signed similar agreements with the National Research Council of Canada and the Canadian Space Agency.

Opportunities considered for investment by the CSTGF will be assessed against the following criteria:

- personal commitment by the principals to the project/business;
- uniqueness and global competitiveness of the discovery;
- potential to protect the intellectual property;
- potential breadth and value of the commercial applications;
- management experience and credibility;
- promise of a sustainable competitive advantage associated with superior technology;
- investment liquidity within a one- to seven-year time frame.

The CSTGF has a short application form for applicants to complete and forward to TIMCO along with their business plan and/or investment proposal. To obtain further information about the CSTGF, or to obtain a copy of the application form, contact:

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Research Update

Wheelchair users to benefit from research at École Polytechnique

A new $2.5 million Industrial Research Chair funded by NSERC, Orthofab Inc., Distribution Promed and École Polytechnique will pioneer research in the fast-growing industry of postural aids for wheelchair users. The Montreal group is headed by biomechanics specialist Dr. Jean Dansereau, well known for his previous research into spinal column deformation and his participation in the design of a new type of prosthetic foot.

The team's work is timely. Senior citizens $ the principal users of wheelchairs -- will make up about 15% of the Canadian population in five years. Traditionally, the development of posture products for the handicapped has been driven by clinical observation and empirical research. The Chair program will focus instead on gaining fundamental knowledge through the 3-D imaging and modeling of posture problems. The partnership with Orthofab and Distribution Promed is expected to speed the transfer of university technology and the creation of new products that will improve the quality of life for wheelchair users. The Chair program will also train specialists in rehabilitation engineering at the master's and doctoral level.

New U of O Chair to investigate quality of the St. Lawrence ecosystem

One of the National Water Research Institute's most prominent aquatic scientists, Dr. David Lean, has been named to the new NSERC Industrial Research Chair in Ecotoxicology at the University of Ottawa. The former Environment Canada researcher will spearhead a rigorous scientific examination of pollution in the St. Lawrence River near Cornwall, Ontario. He will share his time between the Department of Biology on U of O's campus and the laboratory facilities of the St. Lawrence River Institute of Environmental Sciences in Cornwall, a non-profit organization dedicated to research and education.

Five industry partners with operations in the Cornwall area (Domtar Specialty Fine Papers, Dupont Canada Inc., ICI Forest Products, Ontario Hydro, and Universal Terminals) have teamed with NSERC and the U of O to invest $900,000 in the Chair over the next five years. One of the Chairholder's first duties is to assess the ecological state of the St. Lawrence River and provide scientific information to the industrial partners on developing environmentally friendly management practices.

NOVA and the University of Alberta join forces to prevent pipeline cracks

Two new Industrial Research Chairs at the University of Alberta will support innovation in the gas and pipeline industry. NOVA and NSERC will contribute $600,000 each to establish the chairs -- a Senior Chair in the area of advanced pipeline materials, and a Junior Chair in the area of pipeline welding and corrosion. Appointed to the Senior Chair is Dr. Fernand Ellyin of the U of A's Department of Mechanical Engineering; the Junior chairholder will be appointed in the near future.

The industrial partner, Novacor Research and Technology Corporation, is a non-profit company providing research expertise to the NOVA group of companies, including Nova Gas Transmission Ltd (NGTL), which makes its revenue from moving natural gas to market. The pipeline industry seeks a cheaper alternative to steel pipes and better guarantee (more than 20 years) against breakage and corrosion. The research team hopes to develop a material that can be field cured at ambient temperature so that pipes can eventually be manufactured on site.

New Brunswick Power, Xerox, NSERC and SSHRC support information technology research at UNB

NB Power and Xerox are the latest partners in a program launched by NSERC and SSHRC to examine the management of technological change. The four organizations will contribute a total of $1 million to the creation of the Chair in the Management of Human Resources, Technology Learning and Work in a Digital Economy at the Saint John campus of the University of N.B. The Chair's research program willl focus on challenges created by information and communication technology in the areas of human resources, skills training and work organization, with specific emphasis on the long-term implications for business planning and strategies. Chairholder Dr. Charles Davis brings wide experience in technology management and policy to the position. He was previously the principal program officer for science and technology management and policy at the International Development Research Centre in Montevideo, Uruguay.

Council Adopts Code to Enhance Public Confidence

At its January meeting, Council approved the adoption of a Code of Ethics and Business Conduct for its members. The Code was designed to enhance public confidence in the integrity, objectivity and impartiality of Council members. It requires individuals on Council to practice ethical behaviour, to disclose real, potential or apparent conflicts of interest, and to abide by any compliance measures that the President will determine as required.

The Code recognizes that Council is first and foremost a governing body which focuses primarily on issues of policy and process. To be an effective governing body, Council must be composed of knowledgeable individuals who do research, manage research or use research. Consequently, members of Council will include recipients of NSERC awards, senior administrators of universities which benefit from NSERC support, and officers of companies which have been, are, or could become involved in partnerships with NSERC. Council believes a strong Code of

ethics and business conduct is essential to ensure that its operations and decisions continue to merit the trust and confidence of the public, the research community and NSERC staff.

The new Code embodies the principles enunciated in the Federal Conflict of Interest and Post-Employment Code for Public Office Holders.

A Call for Nominations
The 1998 Canada Gold Medal for Science and Engineering

The Natural Sciences and Engineering Research Council is seeking nominations for next year's Gold Medal. Do you know someone with the appropriate qualifications? To find out how to nominate him or her, read on.

Who can be nominated?

Persons from any sector -- academic, business and industry, or government (excluding current NSERC Council members) -- who have made outstanding and sustained contributions to Canadian research in the natural sciences and engineering.

Posthumous nominations will not be accepted.

What type of achievements are we looking for?

Achievements of exceptional importance and impact that lead to the enhancement of the research enterprise in Canada. For example,

- contributions to knowledge;
- application(s) of existing knowledge to the novel solution of practical problems;
- promotion or management of research activity;
- leadership in the transfer of knowledge.

How do you nominate someone?

Just send us

- an up-to-date curriculum vitae for the nominee;
- a comprehensive summary (up to 4 pages) of the nature of each achievement, the extent of its significance, benefit and impact, and the nominee's role in bringing about the achievement(s);
- the names and addresses (including e-mail) of 5 to 7 individuals from Canada or abroad who could assess the nominee's suitability for the award. Include a one-paragraph biography for each and a rationale for their selection as a referee.

The deadline for nominations is September 1, 1997.

More details on the nomination procedures are available in NSERC's Tribute to Research Excellence brochure. For a copy, contact:

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